St. Xavier's Sr. Sec. School
Delhi-54

Pre Board Examination 2016
Std. 12
18-01-2016

Set 2

CHEMISTRY

Max. Marks : 70
Time : 3 hrs.

General instructions : -
i) All questions are compulsory.
ii) Question numbers 1 to 5 carry one mark each.
iii) Question numbers 6 to 10 carry two marks each.
iv) Question numbers 11 to 22 carry three marks each.
v) Question number 23 is a value based question carrying four marks.
vi) Question numbers 24 to 26 carry five marks each.

1. In corrundum the oxide ions are arranged in hexagonal closed packing and aluminium ions occupy 2/3rd of the octahedral voids. What is the formula of corundum? 1

2. In terms of the band theory differentiate between an insulator and conductor. 1

3. Give any two advantages of a fuel cell. 1

4. Name the following :-
   a) A metal which can be refined by Van Arakel method.
   b) Ores which can be concentrated by Froth floatation method. 1

5. Explain the mechanism involved in the hydration reaction of ethene in acidic medium to form ethanol. 1

6. Aluminium crystallises in fcc packed structure. Its metallic radius is 125 x 10^{-10}cm.
   i) What is the length of the side of unit cell?
   ii) What is the number of unit cells in aluminium crystal? 1,1

   (OR)

   Lithium crystallises in body centred structure. Its density is 0.53g/cm^3 and its molar mass is 6.94g/mol.Calculate the volume of a unit cell of lithium metal. Given that atomic mass of Li = 6.94, Avogadro's no. = 6.023 x 10^{23}. 2

7. a) Define :- i) An ideal solution ii) Vapour pressure
   b) Henry's law constant for molality of methane in benzene at 298K is 4.27 x 10^5 mm of Hg. Calculate the solubility of methane in benzene under 760 mm of Hg . 1,1

8. a) Differentiate between Lyophillic and Lyophobic sol. (Two points only).
   b) Explain the relationship between extent of adsorption and pressure at constant temperature with the help of a properly labelled graph. 1,1

9. a) $4\ H_3PO_3 \rightarrow PH_3 + 3\ H_3PO_4$ is called a disproportionation reaction. Justify.

b) Arrange the following as indicated :-
$HClO_4$, $HClO_3$, $HClO_2$, HClO (increasing order of acidic strength)
HCl, HF, H Br, HI (increasing bond dissociation energy) 1,1

10. For the following complex :- (½x4=2)
$[Fe\ Cl\ (NH_3)_5]\ Br$
a) Assign IUPAC name to the complex.
b) Identify the type of isomerism possible in this complex.
c) What is the coordination number of iron?
d) Only name the chemical required to distinguish between this complex and its isomer.

11. a) What is reverse osmosis? Give one use of it.
b) Urea forms an ideal solution in water. Determine the vapour pressure of an aqueous solution containing 10% of urea by mass at 40^oC. Vapour pressure of pure water at this temperature is 55.3 mm of Hg. Molecular mass of urea = 60. 1,2

12. a) Define Kohlrausch's law of independent migration.
b) A cell in which the following reaction takes place:-
$2Fe^{3+}(aq.) + 2\ I^-(aq.) \quad 2\ 2Fe^{2+}(aq.) + I_2(s)$
has $E^0_{cell} = 0.236$ V. Calculate the equilibrium constant of the cell reaction.
Given that standard free energy = – 45.55 K J/mol. R = 8.314×10^{-3} KJ/k/mol
(Solve upto log K_C value.) 1,2

13. a) Give reason for the following :-
i) Physisorption decreases with increase in temperature.
ii) Powdered substances are more effective adsorbents than their crystalline form.
b) What is observed when:-
i) an electrolyte NaCl is added to ferric hydroxide sol?
ii) electric current is passed through a colloidal solution?
c) i) Give one method used for de-emulsification of milk.
ii) Give one example of heterogeneous catalyst. 1,1,1

14. Explain the following with the help of reactions only:- 1,2
a) Extraction of silver metal from silver sulphide.
b) Concentration of alumina by Bayer's process.
c) Extraction of iron in blast furnace from Haematite.

15. a) Draw the structure of H_3PO_2 and find its basicity.
b) Complete the following reactions and balance if required:-
i) $KNO_2 + O_3 \rightarrow$
ii) $SO_3 + H_2SO_4 \rightarrow$ 1,2

16. Give reason for the following :-
    a) Xenon forms compounds with fluorine even though Xenon atom has a closed shell configuration.
    b) PF_5 is known but NF_5 is not known.
    c) HF is much less volatile HCl. 1,1,1

(OR)

    a) SO_2 acts both as a reducing agent as well as an oxidising agent. Explain.
    b) Boiling point of PH_3 is lower than NH_3. Why?
    c) What are inter halogens? Compare their reactivity with halogens giving suitable reason. 1,1,1

17. a) Draw and label the d orbital splitting diagram for a tetrahedral complex.
    b) Explain the hybridisation in $[Ni(Cl)_4]^{2-}$ on the basis of valence bond theory. Predict the shape and magnetic character of this complex. Given that atomic number of Ni = 28. 1,2

18. a) Give an example of:-
        i) A semi synthetic polymer.
        ii) Thermosetting polymer.
    b) Differentiate between a homo-polymer and co-polymer.
    c) Write the reaction involved in the preparation of Nylon 6. 1,1,1

19. a) Explain the following terms related to proteins:-
        i) Peptide bond ii) Denaturation
    b) What happens when Glucose–D is treated with HI in presence of red phosphorous? (write the reaction involved)
    c) i) Which disease is caused due to the deficiency of vitamin D?
        ii) Write one difference between DNA and RNA.

20. a) Assign IUPAC name to the following organic compounds :-
        i) $CH_3CH = CHCH_2COOH$
        ii) $C_6H_5CH_2CH_2OH$
    b) Suggest one suitable test to distinguish between the following organic compounds :-
        i) Primary and secondary amine.
        ii) Propanol and propanoic acid. 1,2

21. Explain the following named reactions with the help of chemical reactions involved:-
    a) Kolbe's reaction b) Cannizaro's reaction
    c) Hydroboration oxidation reaction 3

22. Give reason for the following:-
   a) o-nitro phenol is more acidic than o-methyl phenol.
   b) Although tri-methyl amine $[(CH_3)_3 N]$ and n-propyl amine $[CH_3CH_2CH_2NH_2]$ have the same molecular mass but the former boils at a lower temperature (276K) than the latter (322K).
   c) As we move down the homologous series of alcohols the melting point, boiling point increases. 3

23. Vishal was very upset and worried. His class fellow Arjun asked him the reason. He replied that since morning he has a burning sensation, stomach is bloated and he feels like vomiting. He also told Arjun that he had taken Eno but no effect. Arjun told Eno has only a temporary effect and suggested him to consult a doctor. The doctor diagnosed properly and prescribed the medicines. Vishal was much better after two hours.
After reading this passage answer the following questions :-
   a) What values are expressed by Arjun?
   b) Name the problem the doctor would have diagnosed?
   Name one medicine used in this problem.
   c) What is Eno? Explain how does Eno work?
   d) What is the general name of medicines prescribed for the problem Vishal is suffering from? 1,1,1,1

24. a) An organic compound has the molecular formula C_4H_8O. From each of the following observations draw suitable conclusion and assign IUPAC name to the compound. (Rewrite the table and complete it.)

Observation	Conclusion
i) Compound produces a yellow precipitate with DNP reagent.	_____
ii) Compound does not show any change with Fehling's solution.	_____
iii) Compound answers iodoform test .	_____
iv) Name of the given compound is :-	_____

   b) How would you bring about the suitable conversions:-
      i) Toluene to m-bromo benzoic acid.
      ii) Sodium phenoxide (C_6H_5ONa) to ethoxy benzene.
      iii) 2-Chloro butane to But-2-ene.

(OR)

   a) An organic compound A having a fruity smell has the molecular formula $C_8H_{16}O_2$. From each of the following observations draw suitable conclusion. (Rewrite the table and complete it.)

Observation	Conclusion
i) Compound A was hydrolysed with dil. Sulphuric acid to produce a carboxylic acid B and an alcohol C.	functional group present in compound A is _____

ii) Compound C on oxidation with chromic acid produced compound B	Structure of compound B _____
iii) Compound C on dehydration produces but-1- ene .	Structure of compound C _____
iv) Structure of compound A is	_____

b) In the following reactions identify compounds A, B etc. :-

i) $CH_3COCl \xrightarrow{H_2/BaSO_4} A \xrightarrow{CH_3MgBr} B$

ii) $C_6H_5NH_2 \xrightarrow{CH_3COCl} A \xrightarrow{Br_2 \text{ in } CS_2} B$

iii) $C_6H_5N_2Cl \xrightarrow{Cu/HCl} A \xrightarrow[\Delta]{\text{Aq. NaOH}} B$ 2,3

25. a) For a hypothetical reaction A + B + C $\rightarrow$ Products the rate law expression is :- Rate = $K[A]^m [B]^n$, predict the overall order of the reaction and the order w.r.t reactant C.

b) Time required to decompose SO_2Cl_2 to half of its initial amount is 60 minutes. If the decomposition is a first order reaction calculate the rate constant.

c) The decomposition of A into product has value of K as 4.5×10^3 sec.$^{-1}$ at 283 K and energy of activation is 60×10^3 J/mol. At what temperature would K be 1.5×10^4 sec^{-1}. Given that R = 8.314 K/J/mol. 1,1,3

(OR)

a) With the help of labelled energy level diagram only explain the effect of catalyst on the rate of reaction.

b) Define rate determining step.

c) For a first order reaction rate constant is 60 sec.$^{-1}$. Calculate the time required to reduce the initial concentration of the reactant to its 1/16th value. 1,1,3

26. a) Write the balanced chemical reaction between acidic solution of potassium permanganate and oxalic acid.

b) Define transition metals. What is their general configuration?

c) What is 'Lanthanoid contraction'? Give its one consequence.

d) Give reason for the following :-

i) Transition metals form alloys easily.

ii) Of the d^4 species $_{24}Cr^{2+}$ is strongly reducing while $_{25}Mn^{3+}$ is strongly oxidising. 1,1,1,2

(OR)

a) What is the effect of pH change on potassium dichromate?

b) Write the balanced chemical reaction involved in the preparation of potassium dichromate from chromite ore.

c) i) Discuss the paramagnetic character in 3d series of transition metals.

ii) Zn, Cd and Hg are not considered to be transition metals. Why? 1,2,2

-x-x-x-x-x-x-